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ABSTRACT

Applying techniques and statistical procedures of market research, this research paper treats the subject of environmental education. The first segment of the paper is involved with the identification of the role marketing can play in the analysis of environmental curricula and defines the potential market for environmental education. Sampling techniques were employed to divide the market into "Adapter Categories," categories of teachers grouped on interest and knowledge about environmental education. A second segment of the research concerns itself with correlation of teacher curriculum preference with various environmental education curriculum attributes. The research concludes that the focus on environmental education curriculum development should be on teacher preferences rather than on expert judgment if environmental education is to be marketed at the optimum level. A seven-entry bibliography concludes the paper. (RE)

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ENVIRONMENTAL EDUCATION: A MARKET SURVEY

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With environmental deterioration emerging as the social issue of the decade, increasing emphasis is being placed upon the construction of environmental education materials for the public schools. If these materials are to achieve their objectives, however, they must succeed in attracting and holding the interest of the classroom teacher. This paper argues that marketing, because of its focus on understanding and satisfying consumer needs, could play a key role in the development and diffusion of environmental education. More broadly, its interest is to explore components of the marketing research model for use in the context of curriculum development.

The Role of Marketing

Marketing is concerned with the problem of developing and selling products and services which satisfy consumer needs. Marketing people view the problem as one of developing the right product, backed by the right promotion, and put in the right place at the right price (McCarthy, 1968). Older concepts of marketing are primarily focused upon selling and promoting products. Maximizing profits, the object of marketing, is achieved through sales volume. Newer concepts of marketing, however, focus on the needs of the consumer and integrate all aspects of the marketing mix to meet them. Profits are realized by maintaining customer satisfaction. Whereas the older concept has limited applicability outside the business sector, the newer concept harmonizes well with a variety of enterprises where profit is not the primary motive.

Kotler (1972) gives us this definition of marketing management:

> Marketing management is the analysis, planning, implementation, and control of programs designed to bring about desired exchanges with target audiences for the purpose of personal or mutual gain. It relies heavily on the adaptation and coordination of product, price, promotion, and place for achieving effective responses (p. 12).

The central goal of environmental education is a citizenry capable of living within the limits imposed by a closed system. In many ways, environmental education resembles a social campaign in which the objective is to implant a set of attitudes and a base of knowledge capable of fostering adequate responses to a variety of circumstances. The "core" product of environmental education is an idea or vision of man in harmony with natural systems. The tangible or "buyable" product with which this study is concerned is a curriculum program. Past efforts in curriculum development have generally been guided by expert opinion (see Graig, 1927) or by criteria that reflect specific student outcomes (Herron, 1971). While the student may be the ultimate consumer of curriculum content, this paper suggests the view that the primary consumer of curriculum materials is the classroom teacher.

Defining the Potential Market

One goal of this study is to define the potential market for environmental education. A large-scale (n = 798) consumer survey was undertaken in which the teacher population was allowed to define its own level of involvement. The survey instrument was mailed to a stratified (by subject area) random sample of secondary school teachers in the state of Oregon. Employing a straightforward method of self-report, one item assessed the respondent's knowledge of environmental issues; another, the interest in

environmental education; and a third, the respondent's use of environmental themes in the classroom. "Environmental education" was very broadly defined so that responses reflect the individual teacher's personal sense of the term's meaning.

Teachers showing no interest in environmental education were classified as "non-adopters" and separated from the sample. The remainder were identified as the potential market and were divided into "potential adopters," those indicating an interest but no use, and "adopters," those indicating both interest and use. On a useable return rate of 69%, the major finding from this portion of the survey is that over 80% of the total sample fell into the potential market; 12% were potential adopters and 70% were adopters (Table 1).

It is important for anyone marketing a new product to be able to identify the salient characteristics of the potential market in order to integrate the appropriate combination of marketing variables. Any particular market, however, is far from homogeneous and is usually made up of many parts or segments which are critical in identifying the real marketing opportunities. Historically, American business firms regarded appeal to the mass market as the key to profits and have treated the market as a collection of buyers undifferentiated in their needs and desires. As competition intensified, however, profit margins declined as did each firm's market share. This provided the impetus for gaining advantage through market segmentation. Segmentation is crucial to the marketing orientation we have accepted: the understanding and satisfying of consumer needs. If needs were undifferentiated, we could ignore that aspect and return to a mass marketing strategy. If needs are differentiated, however, it is through segmentation that the potential of various target markets is realized.

Table 1

ADOPTER CATEGORY FREQUENCY DISTRIBUTIONS

Categories	Number (n = 550)	Percent based on Number Returned
Non-adopter Total	98	18
Ignorant	14	3
Knowledgeable 1	41	7
Knowledgeable 2	41	7
Knowledgeable 3	2	0
Potential Market	452	82
Potential Adopter Total	67	12
Potential Adopter 1	60	11
Potential Adopter 2	7	1
Potential Adopter 3	0	0
Adopter Total	385	70
Adopter 1	63	11
Adopter 2	217	39
Adopter 3	97	18
Adopter 4	8	1
Volunteers for Part II	414	75

Kotler (1972) states:

> Market segmentation is the subdivising of a market into homogeneous subsets of customers, where any subset may conceivably be selected as a market target to be reached with a distinct marketing mix (p. 166).

While the primary objective of this part of the study was to define the potential market for environmental education, a secondary objective was to locate characteristics that would discriminate between adopter categories. Such characteristics could then be used as a basis for segmentation. "Adopter" categories were compared on 19 non-product specific characteristics. By and large, characteristics that were selected had been linked in the literature to the quality of "innovativeness" (Rogers and Shoemaker 1971). Significant differences (.05 level or better) were found on five of the 19 characteristics: subject area taught, political philosophy, number of other teachers known to be using environmental themes in their classrooms, degree of student influence on respondent's teaching, and environmental attitudes. Only subject area taught provides a likely basis for a useful segmentation. The others are not identifiable by any readily observable means and therefore, their utility is limited to the general insights they cast on the groups between which they discriminate.

The probability that subject area would figure heavily in choice behavior seemed overwhelming. The real question revolved around how to utilize this knowledge to make the most appropriate selection of subjects for future study. Two criteria were formulated to aid in the selection. First, we wanted to aim the study at the largest markets available. This eliminated most of the non-academic subject areas since they generally

account for a smaller proportion of teachers in the potential market. But a certain amount of caution needs to be exercised. The base number of teachers in each subject area is not an appropriate guide. Certain subject areas contribute disproportionately to the potential market which would not be reflected in the base totals. Table 2 shows the breakdown of the potential market by subject area. The most useful guide is the percent of the potential market based upon useable returns. However, since the probability of a useable return is dependent to some extent on membership in the potential market, we also include the percent of useable returns based upon the total mailed. A high figure in both columns indicates a significant portion of the subject area in the potential market.

Characteristics of the Consumer

Three subject areas were chosen for detailed examination -- science, social studies, and language arts. A second consumer survey (n = 120) was undertaken among members of the potential market in those areas (Table 3). In addition to subject area, the sample was also stratified on the basis of interest shown in environmental education. The use of a variety of follow-up techniques resulted in a 91% useable response rate.

The marketing instrument was constructed on the rationale of the multi-attribute attitude model of consumer choise behavior. According to this model, brand (curriculum) preference is a summation, across brand attributes, of the importance of an attribute times the individual's belief concerning the extent to which a satisfactory level of the sttribute is embodied in the brand.

Table 2

BREAKDOWN OF THE POTENTIAL MARKET BY SUBJECT AREA

Subject Area	Total Sample	Useable Returns	% Useable Returns	Pot. Market	% Pot. Market	% Pot. Market in Useable Returns
Arts and Crafts	30	17	57	14	3	82
Business Education	49	35	71	23	5	66
Foreign Language	39	23	59	18	4	78
Homemaking	42	32	76	30	7	94
Industrial Arts	33	24	73	21	5	88
Language Arts	168	102	61	93	21	91
Mathematics	118	96	81	60	13	63
Music	31	21	68	7	2	33
Physical Education	68	36	53	28	6	77
Science	87	67	77	66	15	99
Social Studies	115	82	71	77	17	94
Vocational Education	18	15	83	15	3	100
TOTAL	798	550	69	452	101	82

Table 3

SURVEY DESIGN WITH N's PER CELL

	Language Arts		Science		Social Studies		
	A.C. #1	A.C. #2	A.C. #1	A.C. #2	A.C. #1	A.C. #2	Total
Package 1	3	3	3	4	4	3	20
Package 2	3	3	3	4	4	3	20
Package 3	3	3	3	4	4	3	20
Package 4	3	3	4	3	4	4	20
Package 5	3	3	4	3	3	4	20
Package 6	3	3	4	3	3	4	20
Total	18	18	21	21	21	21	120

$$A_{jk} = \sum_{i=1}^{n} I_{ik} \cdot B_{ijk}$$

where:

A = Summary attitude.
I = The weight or importance of an attribute
B = The evaluative aspect or belief toward an attribute.
i = Attribute.
j = Brand.
k - Consumer.

Fifteen curriculum attributes were chosen for use in this study (Figure 1). Respondent attitudes toward six commercially available environmental packages[1] were obtained along with data reflecting the components of the multi-attribute model. The six packages were chosen to represent the array of curriculum attributes thought likely to be significant in consumer response.

If the multi-attribute model used in this study is accurate, brand preference is explained by attitudes -- made up of perception of and values for given product attributes. Since perception is product related, the fundamental dimension separating groups with differing brand preferences is the relative value or importance assigned to product attributes.

Importance ratings were taken on fifteen product attributes using a 7-point continuum scale running from "no importance" to "crucially important." Each score was adjusted for oth means and standard deviation through a standard z score transformation.

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[1] Classroom materials constructed for environmental education are seldom pulled together into one coherent curriculum; therefore, the term package is used as a general descriptor for one or more materials distributed as a set by a single source.

Figure 1

FIFTEEN CURRICULUM ATTRIBUTES

1. COST is the amount of money required to make successful use of instructional materials in the classroom.

2. PREPARATION TIME is the amount of time needed to adequately prepare to use a set of materials in the classroom.

3. PHYSICAL APPEARANCE is a measure of the feeling that is transmitted by the "look" of a set of materials.

4. ABILITY LEVEL is the grade for which materials appear most appropriate.

5. CLASS TIME is the total amount of instructional time that would be required to make meaningful use of a set of materials.

6. INTENDED USER is the group -- students or teachers -- for which the form or structure is most suitable.

7. REFERENT describes how close the subject matter of a set of materials is to the student.

8. APPROACH is an indicator of the kind of interaction encouraged by a set of materials between teacher, student, and content.

9. COMMUNITY PARTICIPATION is the extent to which materials encourage the use of resources from the local community.

10. PERSPECTIVE describes the manner in which value-laden issues are handled.

11. PARTIALITY is the degree to which certain arguments are favored in the presentation.

12. SUBJECT AREA CONCORDANCE is a measure of comparability with traditional notions of curriculum and instruction in your subject area.

13. COMPATIBILITY is the degree of fit between expectations and demands.

14. TRIALABILITY is the extent to which a set of materials may be tried out on a limited or trial basis.

15. COMPLEXITY is the degree to which the proper utilization of a set of materials becomes a complicated affair.

$$IZ_{ik} = \frac{I_{ik} - I_{\cdot k}}{S_{\cdot k}}$$

Where:

IZ = Importance z score transformation.
I = Raw importance score.
S = Standard deviation.
i = Attribute.
k = Respondent.

The chester analysis program HICLUS (johnson, 1971) was used to form market segment by grouping subject with similar attribute importance responses. The analysis yielded the four clusters described statistically in Table 4. The cluster statistic reported in the table is a relative indicator of the strength or compactness of the cluster. The higher the statistic, the more similar are members of the cluster.

The chief advantage of the multi-attribute model lies in its diagnostic qualities. Determination of brand strengths and weaknesses on relevant product attributes can then be used to suggest specific changes in a brand and its market support. The first step in utilizing the diagnostic qualities of the model is to isolate the relevant product attributes. The second step is to analyze the expression of these attributes in specific curriculum packages and the evaluation of them by different market segments.

Table 5 shows the results of regression analysis across the Cluster Set. The attribute evaluation variables were entered stepwise into the analysis until the F to enter the next variable became less than 4. This insured that variables in the regression equation are significant at approximately the .01 level or better. The defendant variable was an overall statement of preference for a given curriculum package.

Table 4

DESCRIPTION OF CLUSTERS

Cluster	Size (n)	Cluster Statistic
	22	5.79
	30	8.03
	21	2.79
	36	11.35
	109	

Table 5

RESULTS OF REGRESSION ANALYSIS

Cluster	R^2	df	Var.	Beta
A	.53	3,54	Sub. Area Concord.	.44
			Referent	.36
			Ability Level	.20
B	.52	3,87	Prep. Time	.39
			Approach	.28
			Class Time	.21
C	.28	2,56	Class Time	.35
			Referent	.28
D	.15	2,90	Referent	.24
			Appearance	.23
Combined	.34	5,305	Referent	.18
			Prep. Time	.15
			Appearance	.17
			Sub. Area Concord.	.18
			Approach	.15

We first observe that relatively few variables are allowed to enter the equation. Only five out of the fifteen are allowed in the combined regression equation, and no more than 4 are allowed into the equations of the individual clusters. Of course, we could lower the F required to enter, but negative beta weights begin appearing, indicating a chance occurrence at the given significance level. Secondly, there appears to be considerable overlap in that several variables are significant predictors for more than one cluster. This indicates that relatively few variables account for most of the variance in a curriculum choice decision.

Further analysis is shown to provide as complete a picture of the market as the data will permit. In Table 6 the variables found to be significant predictors are listed along with the levels of each. Responses are divided by package to demonstrate the perceived level of the variable characterizing that package. The mean attribute evaluation score is then entered for that level of that variable in that package. The description of the market begins with a subtable of the complete matrix showing margin totals as well as individual cell entries. A final entry gives the mean summative attitude by package.

There were five levels created for each perception variable. Each respondent received one real package (out of a possible 6) for which he indicated the perceived level of the attribute or variable. This results in a matrix containing 30 cells. Since some clusters contain as few as 21 subjects, it is clear that there are many blank cells and virtually no possibility of establishing statistically significant differences between cells. Subtable 2 of the description shows the results of a one-way analysis of variance for each variable across packages and collapsing through variable levels. A modified version of the least significant difference range test

Table 6

ANALYSIS OF CLUSTER B

6.1 Attribute Evaluation Means (Broken Down by Perception Level and Package)

Variable	Perception Level	Packages 1	2	3	4	5	6	avg.
PREP. TIME n = 120 missing 13 (n = 107)	Much Less	---	7.0 (1)	---	---	---	---	7.0 (1)
	Somewhat Less	6.0 (1)	---	7.0 (1)	---	7.0 (1)	5.5 (2)	6.2 (5)
	About the Same	6.0 (3)	6.0 (2)	5.5 (2)	6.5 (2)	5.3 (3)	6.0 (2)	5.9 (14)
	Somewhat More	3.5 (2)	---	---	4.7 (3)	---	---	4.2 (5)
	Much More	3.0 (1)	---	6.0 (1)	---	5.0 (1)	---	4.7 (3)
	Not Applicable[1]	4.7 (10)	6.3 (16)	6.0 (12)	6.3 (15)	5.3 (12)	5.1 (13)	5.7 (78)
	Average	4.8 (17)	6.3 (19)	6.0 (16)	6.1 (20)	5.4 (17)	5.3 (18)	5.60 (107)
Approach n = 120 missing 8 (n = 112)	Teacher Directed	3.0 (1)	---	---	---	5.0 (1)	---	4.0 (2)
	Mostly Teacher	5.0 (3)	6.0 (1)	---	2.0 (1)	2.5 (2)	4.0 (2)	4.0 (9)
	Balanced	6.0 (3)	5.5 (2)	6.0 (1)	---	5.5 (2)	5.7 (3)	5.7 (11)
	Mostly Student	---	---	6.5 (2)	6.3 (3)	---	---	6.4 (5)
	Student Directed	---	---	---	6.0 (1)	---	---	6.0 (1)
	Not Applicable	3.0 (13)	5.9 (16)	5.2 (13)	6.1 (16)	4.4 (12)	4.7 (14)	5.4 (84)
	Average	3.8 (20)	5.9 (19)	5.4 (16)	5.9 (21)	4.4 (17)	4.8 (19)	5.01 (112)

[1] "Not Applicable" means that the respondent evaluated the written description and was not asked to provide perceptions.

Table 6 (continued)

Variable	Perception Level	Packages 1	2	3	4	5	6	avg.
Class Time n = 120 missing 13 (n = 107)	1 Day	---	---	---	---	---	---	---
	2-3 Days	---	6.5 (2)	6.0 (1)	---	5.0 (2)	---	5.8 (5)
	4-8 Days	---	---	6.3 (3)	4.0 (2)	---	6.0 (1)	5.5 (6)
	8-Days-Month	3.0 (1)	---	---	3.0 (1)	4.0 (1)	---	3.6 (5)
	More Than a Month	5.8 (5)	4.0 (1)	---	5.5 (2)	---	4.0 (1)	5.3 (9)
	Not Applicable	4.3 (12)	6.1 (16)	5.6 (17)	5.5 (20)	4.6 (16)	4.7 (16)	5.3 (79)
	Average	4.4 (19)	6.1 (19)	5.6 (17)	5.5 (20)	4.6 (16)	4.8 (16)	5.19 (107)
Summary Attitude		7.1 (19)	10.4 (19)	9.4 (16)	9.5 (21)	8.6 (17)	7.3 (20)	8.69 (112)

6.2 Analysis of Variance (Means Collapsed Across Perception Levels)

Variable	F	F prob.	Packages Grouped in Homogeneous Subsets
Prep. Time	4.72	.001	(1 6 5) (3 4 2)
Approach	6.86	.000	(1 5 6) (3 2 4)
Class Time	3.70	.004	(1 5 6 4) (3 2)
Sum. Att.	7.30	.000	(1 6 5 3) (4 2)

from the Statistical Package for the Social Sciences (SPSS) is calculated, and packages are grouped in homogeneous sub sets. Subtables 3 and 4 are given only for the undifferentiated combined market. Subtable 4 shows the mean level of each perception variable by package. One-way analysis of variance is used to test differences in perception across packages. Subtable 5 gives the results of a one-way analysis of variance of the summative attitude for each package by cluster.

The reader should be aware that the calculation of means and the use of the analysis of variance assumes interval-scaled properties which may or may not be entirely justified here. This is of less importance in the attribute evaluation data, since the 7-point, Likert-type scale has been found to give results that are virtually identical to similarly constructed interval scales (Edwards, 1957). Somewhat more caution, however, needs to be taken in interpreting mean differences in the 5-point attribute perception responses.

Analysis is continued on Cluster B. In deciding to focus on the segment defined by this cluster, the initial requirement was a substantial R^2. If the choice of variables did not account for a relatively large portion of the variance in the regression equation, then attention to these variables would be less likely to ensure success in a marketing effort. Cluster B has an R^2 close to .5. Secondly, we looked for a relatively high cluster statistic indicating a greater degree of similarity among its members. Cluster B has the highest statistic in the set.

Analysis of Cluster B

Cluster B contains about 28% of the teachers in the science-social studies-language arts market. The results of the analysis for this cluster are given in Table 6. Three curriculum attributes were found to be significant predictors of package preference. They are:

1) Preparation Time; 2) Approach, and 3) Class Time

"Class Time" carries approximately 1/2 the weight of "Preparation Time" and 3/4 the weight of "Approach" in the regression equation (Table 5).

In averaging across perception levels, we find that Cluster B evaluates the six packages differently. Package 1 is always evaluated significantly below Package 2. In general, Packages 1, 5, and 6 tend to be evaluated below Packages 2, 3, and 4 across all attributes. The same trend across packages is evident in the summary attitudes.

The marginals going across perception levels show higher evaluations with less preparation time, more student direction, and lower requirements in class time. Although the differences are not always significant, these characteristics are generally associated more with Packages 2, 3, and 4 than with Packages 1, 5, and 6, as shown in Subtables 5.8.3 and 5.8.4 where perceptions are combined across clusters.

More generally, it appears that this segment may be most interested in some short-term, low-effort, add-ons to the existing curriculum. Two of the most important attributes, low requirements in preparation and class time, point to a desire to "spice up" the existing curriculum rather than to make substantive changes.

While the above may be stretching the data somewhat, we can conclude that Cluster B prefers environmental curriculum materials with little preparation time, an approach allowing for student self-direction, and small requirements in class time in that order of importance. Further, these qualities are

best exemplified in Package 2 and also to a lesser extend in Packages 3 and 4. This cluster would probably respond to a well-directed marketing effort.

Summary

The application of marketing strategies to curriculum development is fraught with difficulties. The methodology is not as yet sufficiently advanced to provide secure footing, and the author is the first to admit to inherent defect in the design proposed on these pages. For the field in general, problems are in choosing and implementing procedures for segmentation and in the modeling of consumer choice behavior. Differences in reporting styles is a chronic problem in marketing as in any survey research, and there is the realization that people differ in their ability to know their own minds and to report thereupon.

Despite considerable difficulty with methodology, the investigator is confirmed in his major recommendation: to maintain a strong consumer focus throughout all phases of curriculum development. Conceptually, the focus on consumer needs (where the teacher is viewed as consumer) is quite foreign to the field, but the offer of a mutually beneficial exchange relationship between teacher and curriculum specialist is promising.

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